

**REMARKS**

The final Office Action dated January 5, 2007, the patents and publications relied on therein, and the Advisory Action dated May 3, 2007, have been carefully reviewed, and in view of the above changes and following remarks reconsideration and allowance of all the claims pending in the application are respectfully requested.

Claims 1-43 stand rejected. By this amendment, claims 1, 13-16, 28-30, 42 and 43 have been amended, and claims 1-43 are pending.

Applicant's Attorney wishes to thank the Examiner for taking the time to briefly discuss the Examiner's comments set forth on the Continuation Sheet of the Advisory Action dated May 3, 2007.

**The Amendment To The Claims**

Applicants have amended claims 1, 13-16, 28-30, 42 and 43 as set forth above.

In particular, claims 1, 16 and 30 have been amended as suggested by the Examiner with respect to the objection raised by the Examiner and now include the language "greater than zero." Applicants respectfully submit that these amendments to claims 1, 16 and 30 are directed to formal matters and are not in response to prior art. Thus, these amendments to claims 1, 16 and 30 do not narrow the scope of the amended claims, and no prosecution-history estoppel results from these amendments.

Additionally, Applicants have amended claims 1, 13-16, 28-30, 42 and 43 to better distinguish over the applied art. Specifically, claims 1, 13-16, 28-30, 42 and 43 have been amended so that that claimed sectors are now disk sectors. Support for these amendments to claims 1, 13-16, 28-30, 42 and 43 can be found throughout the specification, for example, at least in paragraphs [18], [20], [21] and [25] of the originally filed patent application, and by the acronym SPIDRE as used throughout the present patent application.

**The Objection To The Claims**

Claims 1-43 stand objected to in the final Office Action because the Examiner has indicated that the claims should include the language "n and c being integer values numbers greater than zero."

Applicants have amended claims 1, 16 and 30, as suggested by the Examiner with respect to the objection raised by the Examiner. As previously mentioned, these particular amendments of claims 1, 16 and 30 are directed to formal matters and are not in response to prior art. Thus, the amendments to claims 1, 16 and 30 do not narrow the scope of the amended claims, and no prosecution-history estoppel results from the amendments.

Consequently, Applicants respectfully request that this objection be withdrawn.

**The Rejection Under 35 U.S.C. § 102(e) Over Servi**

Claims 1, 16 and 30 stand finally rejected under 35 U.S.C. § 102(e) as anticipated by Servi et al. (Servi), U.S. Patent Application Publication No. 2004/0107400 A1.

Applicants have amended claims 1, 16 and 30, as described above, to better distinguish over Servi.

Applicants respectfully traverse this rejection. Applicants respectfully submit that the subject matter of amended claims 1, 16 and 30 is not anticipated by Servi. Further, Applicants respectfully submit that the subject matter of amended claims 1, 16 and 30 is patentable over Servi.

Regarding amended claim 1, Servi does not disclose a method for protecting data comprising associating  $n$  data information disk sectors with  $c$  redundancy information disk sectors, such that the  $c$  redundancy information disk sectors are based on the  $n$  data information disk sectors, and  $n$  and  $c$  are integer value numbers greater than zero. In contrast, Servi discloses a technique for protecting a data set with a parity set created using an irregular bipartite graph. While Servi discloses in paragraph [0052] that a data set and a parity set created to protect the data set may be stored in different locations on the same storage medium; Servi is silent regarding an arrangement of the data set and the parity set when the data set and the parity set are stored in the same medium. Accordingly, Servi is silent regarding associating information disk sectors with redundancy information disk sectors.

In response to Applicants' arguments, the Examiner states at page 8, lines 13-17, of the final Office Action:

With regard to the rejections under 35 USC § 102(e), it is noted that parity data as used in data processing systems is redundancy data associated with the data that it is meant to protect. The meaning of "parity" as used in RAID systems was

specifically defined as such by the RAID Advisory Board (now disbanded). In fact, any prior art RAID system that utilized parity data would have taught claims 1, 16 and 30.

Applicants respectfully submit that this particular statement by the Examiner relates to a definition of parity as used in RAID systems. In response to this particular statement, Applicants respectfully submit that the Applicants have not and are not distinguishing the subject matter of claim 1 based on a definition of parity. Additionally, the Examiner's assertion that "any prior art RAID system that utilized parity data would have taught claims 1, 16 and 30" is respectfully traversed. In that regard, the Examiner is invited to identify with specificity any prior art that anticipates claims 1, 16 and 30 to support the unsupported assertion that the subject matter of claims 1, 16 and 30 would have been taught by any prior art RAID system that utilized parity data.

Further, Applicants respectfully submit that Servi does not suggest a method for protecting data comprising associating  $n$  data information disk sectors with  $c$  redundancy information disk sectors, such that the  $c$  redundancy information disk sectors are based on the  $n$  data information disk sectors, and  $n$  and  $c$  are integer value numbers greater than zero.

Applicants respectfully submit that the technique disclosed by Servi for protecting a data set with a parity set created using an irregular bipartite graph teaches away from amended claim 1. According to Servi, the parity points in the bipartite graph are selected to have a degree distribution with very few (and preferable no) low degree parity points. (See Servi, paragraphs [0038]-[0040], and [0066].) Servi discloses that for a parity set of a given size, it has been appreciated that better performance can be achieved by allocating parity points to have a relatively higher degree. (See Servi, paragraph [0066].)

Servi discloses one embodiment that "enables a user to specify the number of bits in the data set, as well as the maximum number of parity bits that the user is willing to support." (See Servi, paragraph [0073].) Servi also discloses that Tables 5-8 may be used as a guide for selecting appropriate values. (See Servi, paragraph [0077].) Tables 5-8 show that to achieve a relatively small expected percentage loss of data bits, parity points having a relatively high degree should be used. For example, in Table 5, for a 1 % expected loss for a data set of 5040 bits, the parity degree of the parity bits should range from 160 to 200. The number of parity bits for this particular example is 130. For an expected 10 % loss of 5040 data bits, the parity degree

of the parity bits should be range from 18 to 25. The number of parity bits for an expected 10 % lost of data bits is 860. Tables 6-8 show similar information.

Thus, Applicants respectfully submit that any of the techniques disclosed by Servi to generate parity bits for a selected number of data bits does not yield c redundancy information disk sectors that are based on n data information disk sectors such that n and c are integer value numbers greater than zero. Moreover, Applicants respectfully submit that a person of ordinary skill in the art would simply not use or modify the Servi technique to obtain amended claim 1 because in order to use or modify Servi to be amended claim 1, common sense dictates that the high expected percentage loss of data bits would be plainly unacceptable. Applicants also respectfully invite the Examiner to use the disclosed Servi techniques (i.e., Tables 1 and/or 4 and Tables 5-8) for generating parity bits based on a specified number of data bits such that c redundancy information disk sectors are generated based on n data information disk sectors, and such that n and c are integer value numbers greater than zero, and to disclose the Examiner's results in the next Office Action rather than make unsupported assertions.

Thus, Applicants respectfully submit that amended claim 1 is patentable over Servi.

Regarding amended claim 16, Applicants respectfully submit that amended claim 16 is patentable over Servi for reasons that are similar to the reasons that amended claim 1 is considered patentable over Servi. More specifically, Applicants respectfully submit that Servi does not disclose or suggest a storage medium having a recording format comprising c redundancy information disk sectors that are associated with n data information disk sectors to form a segment, such that the c redundancy information disk sectors are based on the n data information disk sectors, n and c are integer value numbers greater than zero, and such that the segment is stored on a single storage medium that is part of a single storage unit in an array of storage units in a RAID-configured storage system.

Regarding amended claim 30, Applicants respectfully submit that claim 30 is patentable over Servi for reasons that are similar to the reasons that amended claim 1 is considered patentable over Servi. In particular, Applicants respectfully submit that Servi does not disclose or suggest a storage system comprising the claimed data segment that is stored on at least one storage unit, such that each data segment includes n data information disk sectors and c redundancy information disk sectors, and such that the c redundancy information disk sectors are based on the n data information disk sectors.

Consequently, Applicants respectfully request that the Examiner withdraw this rejection and allow amended claims 1, 16 and 30.

**The Rejection Under 35 U.S.C. § 103(a) Over Servi In View of Kaneda**

Claims 3, 6-9, 13-15, 18, 23, 24, 28, 29, 32, 37, 38, 42 and 43 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over Servi in view of Kaneda et al., U.S. Patent No. 5,958,067.

Applicants have amended claims 13-15, 28, 29, 42 and 43, as set forth above, for consistency with their respective base claims.

Applicants respectfully traverse this rejection. Applicants respectfully submits that the subject matter of any of claims 3, 6-9, 13-15, 18, 23, 24, 28, 29, 32, 37, 38, 42 and 43 is patentable over Servi in view of Kaneda. Applicants respectfully submit that Servi and Kaneda are not properly combinable to form a basis for rejection of these claims.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (See, also, MPEP §§ 706.02(j) and 2143).

Regarding the first basic criterion for establishing the a *prima facie case* of obviousness, contrary to the Examiner's statement there is no suggestion in either Servi or Kaneda to combine Servi with Kaneda for "improved response performance and throughput." While the Examiner cites column 3, lines 51-56, of Kaneda as support for such a motivation, the particular portion of Kaneda cited by the Examiner relates to a general description of the Kaneda system. Moreover, Kaneda does not disclose or suggest that the Kaneda disk array system can utilize an error

correction and erasure code that uses a parity set and a data set having a relationship defined by an irregular bipartite graph, such as that disclosed by Servi. Further still, Servi does not disclose or suggest that the disclosed irregular bipartite-graph-based error correction and erasure codes can be used with an array type disk system that updates redundant data in an asynchronous manner with disk access such as that disclosed by Kaneda.

On page 9, at lines 1-10, in the final Office Action, the Examiner responds to this argument by stating:

However, all of the arguments presented on pages 9-12 of the remarks rely on the *bodily incorporation* of two systems (i.e., Servi and Keneda [sic]; Servi and Hetzler), which does not reflect the combinations suggested by the rejections. In the rejections, the secondary references are included because only particular features of those references are meant to be incorporated into the Servi system (e.g., RAID 6, RAID (3+3), RAID 51, etc.), as outlined in the rejections. Applicant has already admitted that many of these particular features were known in the prior art (note pages 1-3 of applicant's specification). The examiner agrees. The various RAID configurations and error correction codes recited in the claims were abundantly well known as common storage options in the art of digital data storage at the time of the invention. [italics in original.]

Applicants respectfully submit that by this statement, the Examiner essentially admits there is no suggestion or motivation in either Servi or Kaneda for modifying Servi or for combining Servi and Kaneda as a basis for this rejection. That is, the Examiner admits that Kaneda is only included in the rejection because particular features of Kaneda are known in the prior art. Thus, it would seem that based on this admission, it is unnecessary for the Examiner to even identify Kaneda as a basis for this rejection. Common sense would dictate that the Examiner would then only need to rely on 'particular features known in the prior art' in combination with Servi as the basis for this rejection. It follows, then, that if the Examiner only really needs to rely on 'particular features known in the prior art,' the Examiner would merely need to assert a motivation or suggestion in the knowledge generally available to one of ordinary skill in the art to modify Servi or to combine the particular features known in the prior art with

Servi. Therein, however, lies the problem with the Examiner's rejection. The Examiner has not alleged any knowledge generally available to one of ordinary skill in the art for modifying Servi or for combining the particular features known in the prior art with Servi, and the Examiner has admitted that Servi and Kaneda provide no suggestion or motivation for combining Servi and Kaneda as a basis for this rejection. Accordingly, there is no basis for this rejection.

One additional deficiency with this rejection is with the Examiner's premise that the subject matter of claims 3, 6-9, 13-15, 18, 23, 24, 28, 29, 32, 37, 38, 42 and 43 is merely the 'particular features known in the prior art.' To the contrary, the subject matter of claims 3, 6-9, 13-15, 18, 23, 24, 28, 29, 32, 37, 38, 42 and 43 comprises the limitations of each respective claim in combination with the limitations of respective base claim(s) of the particular claim. And, for each claim, the Examiner has not established a *prima facie* case of obviousness.

Thus, Applicants respectfully submit that it is only by impermissible hindsight that the Examiner is able to reject claims 3, 6-9, 13-15, 18, 23, 24, 28, 29, 32, 37, 38, 42 and 43 based on the combination of Servi and Kaneda. Neither of the applied publications provides a proper suggestion for combination. Further, the Examiner has not identified a motivation or suggestion in the knowledge generally available to one of ordinary skill in the art to modify Servi or to combine the 'particular features known in the prior art' with Servi. It is only by the Applicants' disclosure that the Examiner can select particular features of Servi, Kaneda or 'particular features known in the prior art' to make the rejection.

Consequently, Applicants respectfully request that the Examiner withdraw this rejection and allow claims 3, 6-9, 13-15, 18, 23, 24, 28, 29, 32, 37, 38, 42 and 43.

### **The Rejection Under 35 U.S.C. § 103(a) Over Servi In View of Hetzler**

Claims 2, 4-7, 10-12, 17, 19-22, 25-27, 31, 33-36 and 39-41 stand finally rejected under 35 U.S.C. § 103(a) as unpatentable over Servi in view of Hetzler et al. (Hetzler), U.S. Patent Application Publication No. 2005/0015700 A1.

Applicants respectfully traverse this rejection. Applicants respectfully submit that the subject matter of any of claims 2, 4-7, 10-12, 17, 19-22, 25-27, 31, 33-36 and 39-41 is patentable over Servi in view of Hetzler. Applicants respectfully submit that Servi and Hetzler are not properly combinable to form a basis for rejection of these claims.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (See, also, MPEP §§ 706.02(j) and 2143).

Regarding the first basic criterion for establishing the a *prima facie case* of obviousness, contrary to the Examiner's statement, there simply is no suggestion in either Servi or Hetzler to combine Servi with Hetzler for "improved performance, protection and efficiency." In particular, Hetzler does not disclose or suggest that the disclosed RAID 3 + 3 system can utilize an error correction and erasure code that uses a parity set and a data set having a relationship defined by an irregular bipartite graph, such as that disclosed by Servi. Likewise, Servi does not disclose or suggest that the disclosed irregular bipartite-graph-based error correction and erasure codes can be used with the Hetzler RAID 3 + 3 system.

In fact, Hetzler discloses that at least one Maximum Distance Separation code that can be used with the RAID 3+ 3 system is a Reed-Solomon code. (See Hetzler, paragraph [0021].) Servi teaches away from use of a Reed-Solomon code by highlighting drawbacks of a Reed-Solomon code in paragraph [0006] and [0126] and in Table 9. Further, Servi provides no disclosure that a Reed-Solomon code should be used in place of the Servi irregular bipartite-graph-based error correction and erasure code. Accordingly, Applicants respectfully submit that it appears that the Examiner is completely overlooking this disclosure of Servi.

Applicants respectfully submit that by the Examiner's statement at page 9, lines 1-10, of the final Office Action, the Examiner essentially admits there is no suggestion or motivation in either Servi or Hetzler for modifying Servi or for combining Servi and Hetzler as a basis for this rejection. That is, the Examiner admits that Hetzler is only included in the rejection because particular features of Hetzler are known in the prior art. Similar to the rejection based on Servi



and Kaneda, it would seem that based on this admission, it is unnecessary for the Examiner to even identify Hetzler as a basis for this rejection. Accordingly, common sense dictates that the Examiner would then only need to rely on ‘particular features known in the prior art’ in combination with Servi as the basis for this rejection. It follows, then, that if the Examiner only really needs to rely on ‘particular features known in the prior art,’ the Examiner would merely need to assert a motivation or suggestion in the knowledge generally available to one of ordinary skill in the art to modify Servi or to combine the particular features known in the prior art with Servi. Therein, however, lies the problem with this rejection, much like the problem with the rejection based on Servi in view of Kaneda. The Examiner has not alleged any knowledge generally available to one of ordinary skill in the art for modifying Servi or for combining the particular features known in the prior art with Servi, and the Examiner has admitted that Servi and Hetzler provide no suggestion or motivation for combining Servi and Hetzler as a basis for this rejection. Accordingly, there is no basis for this rejection.

One further deficiency with this rejection is with the Examiner’s premise that the subject matter of claims 2, 4-7, 10-12, 17, 19-22, 25-27, 31, 33-36 and 39-41 is merely the ‘particular features known in the prior art.’ To the contrary, the subject matter of claims 2, 4-7, 10-12, 17, 19-22, 25-27, 31, 33-36 and 39-41 comprises the limitations of each respective claim in combination with the limitations of respective base claim(s) of the particular claim. And for each claim, the Examiner has not established a *prima facie* case of obviousness.

Thus, Applicants respectfully submit that it is only by impermissible hindsight that the Examiner is able to reject claims 2, 4-7, 10-12, 17, 19-22, 25-27, 31, 33-36 and 39-41 based on the combination of Servi and Hetzler. Neither of the applied patents provides a proper suggestion for combination. Further, the Examiner has not identified a motivation or suggestion in the knowledge generally available to one of ordinary skill in the art to modify Servi or to combine the ‘particular features known in the prior art’ with Servi. It is only by the Applicants’ disclosure that the Examiner can select particular features of Servi, Hetzler or ‘particular features known in the prior art’ to make the rejection.

Consequently, Applicants respectfully request that the Examiner withdraw this rejection and allow claims 2, 4-7, 10-12, 17, 19-22, 25-27, 31, 33-36 and 39-41

Applicants note that additional patentable distinctions between Servi and Kaneda, and Servi and Hetzler and the rejected claims exist; however, the foregoing is believed sufficient to address the Examiner's rejections. Likewise, failure of the Applicants to respond to a position taken by the Examiner is not an indication of acceptance or acquiescence of the Examiner's position. Instead, it is believed that the Examiner's positions are rendered moot by the foregoing and, therefore, it is believed not necessary to respond to every position taken by the Examiner with which Applicants do not agree.

**CONCLUSION**

In view of the above amendments and arguments, it is urged that the present application is now in condition for allowance. Should the Examiner find that a telephonic or personal interview would expedite passage to issue of the present application, the Examiner is encouraged to contact the undersigned attorney at the telephone number indicated below.

It is requested that this application be passed to issue with claims 1-43.

Respectfully submitted,

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